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Challenges of Implementing Cloud Computing in the Arab Libraries Environment

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Abstract: Cloud computing is considered one of the important Web applications that can be utilized in libraries based on their ability to create different forms of information vessels via the library site which allow users to share them. Sharing could be possible by using a ready-made model provided by cloud computing. The main contribution of this paper is to identify the challenges that face the implementation of cloud computing in libraries and information institutions in the Arab environment. The study methodology was conducted by applying Delphi method of which depends on expert consulting in several rounds at least three rounds to come up with results that are useful in identifying their future vision of the subject. The paper concludes that the main challenges of this paper lie in professionalism, training and technical challenges, such as the availability of applications and programs, storage capacity, huge volume of data, privacy and information security.

Keywords: Arab libraries, Cloud Computing, Information Security, Cloud Storage

1 Introduction

Nowadays, there are advanced progress in computing technologies. The library environment is developing considerably, given the significant development of ICT, and in the context of lack of financial resources and budget weakness, there is an increasing need to take advantage of cloud computing applications in the field of libraries to improve services. Cloud computing has emerged as a practical and optimal solution after the provision of Internet infrastructure in various parts of the world. On the network and on top of it multimedia, communication is not a barrier to contact with the cloud, especially after enormous mutation in the side of the issuance of smart phones, which it always carries the characteristics of internet connectivity and the possibility of dealing with various information and files on the network and on top of it multimedia. [1]

Cloud Computing

Cloud computing can be defined as a technology that relies on the transfer of processing and storage space of a computer to the so-called cloud that is accessed via the

Internet. [2]

Cloud computing is characterized by the following:

1. Low-cost PCs for beneficiaries: There are no need to purchase powerful and expensive cloud equipment to utilize cloud computing whereby processes and applications run in the cloud and does not require processing power or hard disk space like the traditional desktop software.
2. Better performance: Due to the lack of loading programs or files on local personal computers, beneficiaries are not subject to delays due to the operation or closure of personal computers. The internal network will become much faster thanks to the absence of any internal traffic.
3. Lower IT infrastructure costs: Cloud computing power can be used to complement or replace internal computing resources instead of investing a large number of big and more powerful servers.
4. Lower maintenance Costs: The maintenance of hardware and software costs for organizations will be much lower, no matter how much more hardware and software are available to the company. It will require fewer servers in the organization for IT staff.

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5. Low software costs: There is no need to purchase software packages for all computers in the organization, but employees who already use applications need to access this application in the cloud.
6. Software update automatically: There are no additional expenses required to update or upgrade programs for organizations.
7. Increasing the possibilities of computing: Using the power of cloud computing is no longer just what a single PC does.
8. Unlimited storage capacity: The cloud provides unlimited virtual storage capacity, and storage can be increased at any time with a small additional charge.
9. Increased data security: All data is stored in the cloud, which encourages not to worry about the loss of disk or any disasters in the office and others.
10. Access to files from anywhere: With the cloud there is no need to take documents, as it is possible to access the PC from anywhere with access to the Internet.
11. Using a personal computer from anywhere and from any other computer.

But there are some challenges facing the application of cloud computing, the disadvantages of cloud computing, including: [3]

1. Security and privacy, since the files and information are stored in the third party, there are concerns about the security of information and privacy. There is no full guarantee not to get attacked by black hackers. Researchers add to this point that the user should focus on aspects of security, we will need to rely on a third party to maintain security and privacy Data and information. But the question to ask and needs to be considered in terms of security and privacy, if your data host disappeared where will your data go? Therefore, it is better for the user to rely on the services of the most prestigious international companies, because they are unlikely to go bankrupt or theft.
2. Dependency (loss of control): Cloud computing imposes full dependence on service providers for everything that concerns them because the cloud is a programmatically closed environment.
3. Lack of flexibility: This service is still unable to provide all the needs of the user and often data loss occurs when updating systems and software for the cloud.
4. Knowledge and integration: Using the cloud requires extensive technical knowledge and experience in dealing with software that may not be owned by some.

Cloud Computing And Digital Libraries

Integration and development of digital library infrastructure based on cloud service, and even cloud-based library automation, all of these involve

research in the cloud-based library sector. Moreover, improvements to the cloud-based digital library service model are also one of the essential material [4]. This can be investigated by analyzing the ongoing digital and informative growth of the university library, where there is demand to analyze the opportunities and challenges that cloud computing technology that can be brought to library development. [5] discussed two strategies to adapt the cloud computing services in digital libraries by renting cloud resources and developing cloud platform . Cloud computing has emerged as a big benefit for libraries, giving libraries multiple ways to link their resources to cloud computing. [6] The enablement of a Higher Education Institution (HEI), focusing on the viability of Cloud Computing services: Infrastructure as a Service (IaaS) [7]. Cloud computing offers an application service framework that can integrate all libraries' digital information resources and process distributed digital resources, information integration, and reconfiguration to better meet user library services needs where the digital book services have become an academic hub for disseminating and processing modern human knowledge. [8] Cloud computing is a platform solution for handling all library systems, including circulation, cataloging, acquisitions, serials, wireless access point, digital tools, internet connectivity, thin client architecture, system data analytics and digital librarians. Cloud computing initiatives for libraries such as "dark archive solution" CLOCKSS, Ex Libris, Dura Cloud, LibLime, Polaris Integrated Library System, the 3M Cloud Library App and OCLC WorldShare Management Services (WMS) and PORTICO. [9] Libraries worldwide have also started using cloud computing to handle e-resources usage, hosting web applications, cataloging online public access, managing digital libraries, hosting various statistical tools and data sets, etc. An examination of the effects of cloud-based library services and understand whether cloud computing is considered a curse or boon. Cloud computing left a huge influence on various institutes or libraries facilities. This technology has provided an opportunity for libraries and a fear of data loss and involving massive costs in building infrastructure, leading to highly scalable, service-oriented architecture and many other things. The most remarkable benefit is online repositories and global access to services. Although implementation is bit costly, libraries move slowly towards cloud computing and are undoubtedly viewed in libraries as a boon in the digital age. [10]

[11] Discussed various existing services and library-based operations that are already offered through cloud infrastructure, in addition to some of the key security problems and risks in data protection have been established with steps to resolve them. Cloud storage is the library's latest technology, where the end-user can conveniently access the library at remote locations. However, using or implementing this technology library faces too many issues like security, data privacy. Cloud computing would concentrate on accessing remote library

users' digital materials. Cloud computing helps LIS professionals build an ecosystem to make library services convenient for their users [12]. The modern cloud and library paradigm has created new model, Cloud Libraries. We need to build these kinds of libraries due to knowledge explosion, difficulties accessing information, saving user and staff time, resource sharing and resource management issues, and most important reason is cost-effectiveness.[13] Cloud computing technology is a new developing approach in modern digital library. In the internet environment and knowledge history, library functions are retrieved from information collection, conventional change management to knowledge management, communication services, and digital library cloud service platform. There are several challenges in solving the long-term management of digital library information resources and in infrastructure-level operation, computer services can improve digital library information resource management and service level across the cloud and reduce the service's management costs by integrating cloud storage and digital library. Digital Library's cloud infrastructure platform is dynamic, can handle and integrate adaptive system's capacity, enjoy a high degree of autonomy, can realize Digital Library Distributed virtualization service can achieve a greater degree of resource sharing and collaboration. Digital library management cloud service platform, with dynamic, capable and optimized adaptive system mechanisms, enjoys a high degree of autonomy, virtualization can deliver distributed digital library services, achieve more intensive information resources, increase the degree of information resource sharing, join the cloud-era application In future, Digital Library's cloud service platform will achieve optimal convenience of both sophistication and mix application. To realize user access using the simplest operation of the most complex demand information, this information can be personalized, unstructured and the user can provide results in the shortest possible time to give users the most convenient access to the terminal equipment. [14] Knowledge collection is the prime component in library cloud computing, supplying libraries with resource and information technology capabilities. E-resources which is an academic libraries demand, database sharing is possible using cloud services, OCLC is one of its co-web example OPAC and can be uploaded to cloud. It offers online cataloging resources.[15] Cloud computing plays a new role in computing, transforming how we invent, develop, scale, upgrade, manage and pay for applications and resources they operate on. Cloud computing has three divisions: program, storage, and networking. Each division serves a different role and sells different business products separately worldwide. In this era, libraries are changing almost by using cloud computing technology. Libraries using cloud-based resources primarily to create digital libraries, social networking and knowledge communication without discarding the concerns about some cloud-related issues like privacy, protection, etc.

Therefore, libraries need to think deeply about library services with cloud-based technology to provide their customers with sincere service. Another task of LIS professionals in this digital era is to make cloud-based platforms a secure platform for delivering library services to users.[16] [17] examines Cloud Computing adoption efficiency and risks in Higher Education Institutions (HEIs) from several perceptions. The analysis emphasizes on the characteristics of CC service quality, which will add value to HEI stakeholder needs. Looking at cloud quality and threats through a multi- perceptions lens. Worldwide universities are moving to cloud computing. Quality features, including access to a broader computing resource network, self-services, agile services, pay-as-you-go services and resource centralization, offer compelling case for HEIs to implement cloud services. Though, the threats that contribute to non-acceptance vary from lack of support from cloud providers to security concerns. The findings indicate that trust, protection and privacy are the main factors of non-adoption as stakeholders believe that cloud computing cannot completely ensure the sensitive information protection. Key factors for cloud adoption include strengthening student-teacher interactions through collaboration resources, and proposing cloud applications for mobile devices to access various learning materials virtually and secure off-campus email. In conclusion, a general significance of cloud computing to libraries, and how libraries can be turned into smart institutions to incorporate cloud technology are discussed by [18]. Five facilities such as internet service, thin client architecture digital librarian, digital resources and wireless access point are considered requirements for cloud computing implementation. It is recommended that libraries will revive and sustain their importance by integrating with cloud computing technologies, which will make them part of the Internet of Things (IoT) experience that will soon rule every educational sector's activities. Libraries in cloud computing technologies will certainly turn into smart library and optimize library services in information era. Each library needs to develop up-to - date knowledge delivery infrastructure and conducive environment that promotes teaching, research and learning.

2 The Problem of The Study And Its Importance

Based on the importance of cloud computing and its potential, and the possibility of using them in the provision of multiple services, including the provision of electronic services in libraries and information institutions. In the light of the vision of the majority of Arab countries for the future, which pay particular attention to education and the development of the knowledge society, and this has pushed the researcher to call for the need to conduct a study to identify the

challenges that Facing the application of cloud computing in the Arab library environment. The problem of the study lies in the following key question:

- What are the challenges facing the application of cloud computing and benefiting from it in the environment of Arab libraries?

The main question of the study is divided into sub-questions:

- 1.What is the availability of educational materials, equipment and technological innovations in Arab libraries?
- 2.What is the importance of cloud computing in Arabic libraries in the digital environment?
- 3.What are the requirements for applying cloud computing in Arabic libraries in the digital environment?
- 4.What are the challenges facing the application of cloud computing in Arabic libraries in the digital environment?

Objectives Of The Study:

The study aims to achieve the following objectives:

- Identify the materials and educational devices and technological innovations more and less available and used in the Arabic libraries.
- To reveal the importance of the application of cloud computing in Arab libraries in the digital environment.
- Identify the challenges facing the application of cloud computing in Arab libraries in the digital environment.

The Importance Of Study:

- Identify the challenges facing the application of cloud computing in Arab libraries in the digital environment.
- This may show how important it is to apply cloud computing in the Arab library environment.
- Identify the challenges facing the application of cloud computing in Arab libraries.

The Limits Of The Study:

The study is represented as follows:

- 1.The study has focused to identifying the challenges of applying cloud computing in libraries in the Arab library environment.
- 2.The study has focused to detecting the availability of materials, and devices and technological innovations in Arab libraries in the digital environment.
- 3.The application of the study has focused to the opinions of experts in the field of libraries and information technology.

Terminology Of Study:

Cloud Computing: a model sample used for appropriate access, and when you need participatory clusters of computerized resources (such as networks, servers, storage devices, applications, and services) that can be made available and deployed quickly, with minimal effort or with a service provider.

This cloud model enhances the reason for availability, as it has five basic features, three service models, and four distributional models. As for cloud libraries, they are intended for this category of distributive models, and for cloud libraries are libraries that rely on cloud computing applications when delivering their services in general.

3 Related Studies:

A number of previous studies related to the subject of the study have been reached through a review of educational literature, research, periodicals and studies, and can be presented as follows:

The study [19], which aimed to introduce cloud computing technology and its importance in general, and in particular in the library environment, as well as the relationship of cloud computing to the knowledge society, and to explore its future, and how can governments and Arab information institutions to benefit of their applications in order to build the Arab knowledge society. On the other hand [3] displayed the assessment of cloud computing in public libraries in Egypt, which applies at different levels, or with respect to open source systems, which naturally are consistent with the general framework along with the concept of cloud computing that It was addressed by [20] open-source cloud computing systems, where it was found that there are projects and systems that follow different cloud computing systems.

The Golden Report[21], which defines the concept of cloud computing and its different types, then discussed how cloud computing affects libraries, their solutions and their benefits through three aspects (technology - data - society) and in another study for each [22] dealt with cloud computing and libraries. On the other hand, the researcher [23] discussed the role and impact of cloud computing on the future of academic libraries specifically through the applications and the available services, and highlighting its relationship with the issues of intellectual property protection and fair use in academic libraries and scientific publishing.

A mechanism to integrate mobile computing with cloud computing and digital libraries was introduced and discussed by[24] as a Synergetic mechanism, the study concludes the benefits that might be gained by applying cloud computing to libraries such as overcome the low storage space limits, improving data transfer, and increase the data transferring speed in addition to share knowledge.

A review for the trends of applications of cloud computing was done by [25], the study discussed the cloud computing services role in different areas and sectors such as: Agricultural, Financial, Educational, Medical and Library Disciplines. The study discussed the requirements and affecting factors for each discipline, and concluded the advantages and disadvantages of using cloud computing in that fields. The study proposed a cloud digital library (CDL) shown in figure 1, as a trend emerging trends in the libraries, where the librarian can choose the most suitable services for their usage in library system. However, the software of library management is installed on the cloud vendor's and maintained by administrators. Libraries may store many contents into available cloud data center, and lastly the various library contents can be browsed by the library users through cloud services.

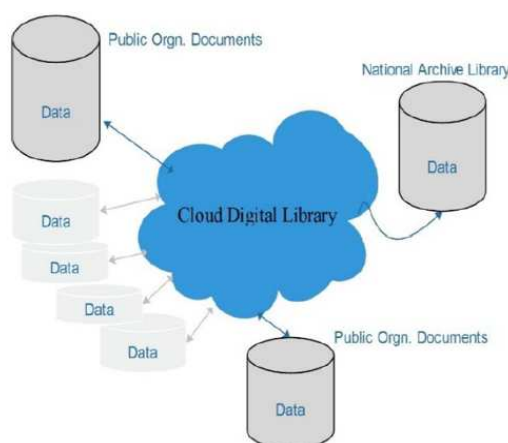


Fig. 1: Cloud Digital Library by [25]

The experiments to test the architecture performance depending on the load is conducted by [26], it focused on how the digital libraries can get benefit from cloud computing in particular in the scalability. The study results discuss the response time for different requests, what it can affect the request, and in addition to that it shows an evidence to support the feasibility of creating and installing cloud-based Digital Libraries. The cost patterns of implementing digital libraries using the cloud computing technologies tested by benchmarking controlled experiments [24], where the study result in that the fast services need more money, good performance can be obtained with less payment, and lastly that the digital libraries can spend less to get faster performance during the service planning. A review study done by [27] conducted to examine what it can be challenged while using the cloud computing to deploy library services, what data issues that can influence IT, the users, the costs

and the challenges of policy. Implementing Software as a Service (SaaS) in libraries was the main challenge in the past studies. The study concluded that there are main seven critical areas to ensure a successful deployment of Software as a Service (SaaS) in libraries are in relation with: data, authentication and privacy of patrons, skills and knowledge of library staff and organizational culture, IT infrastructure, features of services, fixed and operational costs associated with data and technology, and policies and contracts. The challenges and their relationship with the technology, people, and cost are shown in figure 2. [28] proposed a toolkit shown in figure

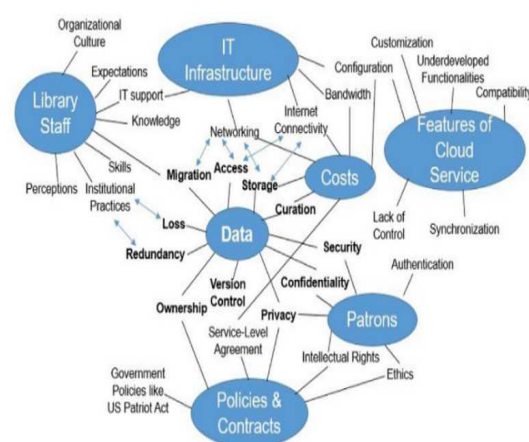


Fig. 2: Challenges to Deploying Library Services in the Cloud by [27]

3 to ease the implementation of complicated digital preservation platforms over cloud computing environment, the toolkit come out as a result of studying the concerns of migrating library services to cloud computing, in particular : storage portability and scalability, platform computing, and the large datasets storage and processing. It's worth here to mention that the data science and big data can be a future work for this study after reviewing many studies due to the bright future of data science, cloud computing and big data [29].

4 Methodology and Procedures of the Study:

Study Approach

Overall, as the objective of the study is considered as a prospective study to explore the challenges facing the application of cloud computing in Arab libraries in the digital environment, the study applied a set of scientific methods to achieve its objectives, as follows:

Table 1: Classification of the study sample.

Round	Academics	Administrators	Specialists	Administrators at the Ministry of Education	Planningspecialists	Total
First	5	11	11	11	11	49
Second	2	11	11	11	11	46
Thirds	2	10	11	8	9	40

Table 2: Means, standard deviations and rank for the availability of materials and equipment in Arab libraries

Number	Paragraph	Means	Standard deviations	Order	Degree of availability
1.	Computers	2.07	.67	1	Medium
2.	Computerized educational software	1.52	.63	14	Medium
3.	Global Communications Network (Internet)	1.69	.73	7	Medium
4.	E-learning books	1.33	.56	27	Low
5.	Transparent projectors	1.82	.78	3	Medium
6.	Fixed movie projectors	1.52	.67	15	Medium
7.	Slide projectors	1.40	.69	25	Low
8.	Dark material projectors	1.49	.55	19	Low
9.	Educational segments	1.46	.67	22	Low
10.	Training courses	1.75	.71	5	Medium
The field as a whole		1.59	.30		Medium

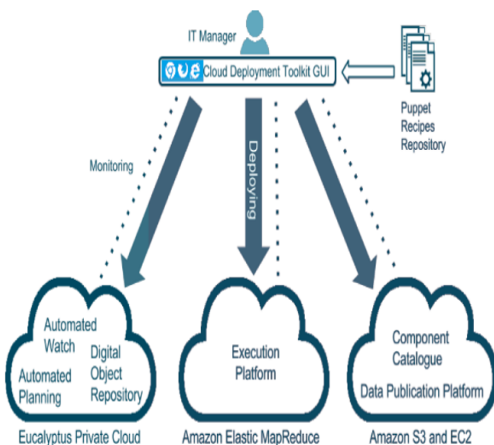


Fig. 3: Digital preservation components mapping on a Heterogeneous Cloud environment by [28]

-Interview method:

Some of the selected experts were interviewed, and a social media dialogue was conducted with others, in the Delphi style of the survey, and their consent was taken to participate in exploring the challenges of applying cloud computing to Arabic libraries in the digital environment.

-Delphi style:

The Delphi method was used as an ideal scientific method in this forward-looking study, based on the opinions of experts and specialists in the subject of the study, to reach the challenges facing the application of cloud computing Arabic libraries in the digital environment.

The study sample:

The study was designed to identify the challenges facing the application of cloud computing in Arabic libraries in the digital environment, using the Delphi method as an optimal scientific method to find out the views of the specialized experts on the proposed concept. The sample selection was intentional and took into consideration the following: - Scientific and practical experience. - Preparedness to cooperate with the researcher, after the first round has been requesting e-mail from the experts and used in the delivery of questionnaires search in the second and third rounds. The study community consists of a group of supervisors of learning resource centers, experienced in the field of libraries, and have the ability to study reality and future planning, according to Delphi style and methodological steps. The researcher tried to reach a number of targeted experts for the sample of the study, and found that the number of experts can be selected in the study more than (60) experts, specializing in libraries and information technology.

Table 3: What is the importance of applying cloud computing in Arab libraries in the digital environment?

M	The statement	Strongly Agree(5)		Agree(4)		Neutral(3)		Disagree(2)		Strongly Disagree (1)		Relative weight		T
		T	%	T	%	T	%	T	%	T	%	S	%	
1	Cloud computing contributes to the objectives of Arab libraries in the digital environment	39	95.1	2	4.9	-	-	-	-	-	-	203	99	2
2	Application of cloud computing in Arab libraries in the digital environment is a strategic requirement.	38	92.6	3	7.3	-	-	-	-	-	-	203	98.5	3
3	Application of cloud computing in Arabic libraries increases the efficiency of its services.	34	82.9	7	17.1	-	-	-	-	-	-	198	96.2	7
4	Cloud computing helps to overcome the high cost of services in Arab libraries	40	97.5	1	2.4	-	-	-	-	-	-	204	99.5	1
5	The beneficiary is the focus of attention in Arab Libraries	30	73.2	11	26.8	-	-	-	-	-	-	194	94.6	9
6	The need for a policy of methods of application Cloud Computing in Arab Libraries	36	87.8	5	12.2	-	-	-	-	-	-	200	97.5	5
7	Application of cloud computing in libraries achieves the goals of digital transformation of society	37	90.2	4	9.8	-	-	-	-	-	-	201	98.1	4
8	Cloud computing application emphasizes the importance of the impact of technology on the work of libraries.	32	78	9	21.9	-	-	-	-	-	-	196	95.6	8
9	The need to organize the work of Arab libraries consistently with the requirements of the digital environment.	35	85.4	6	11.7	-	-	-	-	-	-	199	97.1	6

Table 4: Responses of the study sample

M	The statement	Strongly Agree(5)		Agree(4)		Neutral(3)		Disagree(2)		Strongly Disagree (1)		Relative weight		T
		T	%	T	%	T	%	T	%	T	%	S	%	
1	Provide an infrastructure that meets the requirements of the digital environment.	40	97.6	1	2.4	-	-	-	-	-	-	204	99.5	1
2	Digitizing sources of information.	37	90.2	4	9.8	-	-	-	-	-	-	201	98.1	5
3	Put specific objectives to apply cloud computing	32	78	9	21.9	-	-	-	-	-	-	196	95.6	9
4	Keeping workers informed about cloud computing regulations and policies	33	80.5	8	19.5	-	-	-	-	-	-	197	96.1	8
5	Enabling employees to manage computing software and applications	36	87.8	3	7.3	2	4.9	-	-	-	-	198	96.6	7
6	Enable the beneficiary to identify the rules and instructions of using knowledge sources.	33	80.5	7	17.1	1	2.4	-	-	-	-	196	95.6	9
7	Enable leaders to continue working	31	75.6	10	24.4	-	-	-	-	-	-	195	95.1	10
8	Enable beneficiaries to communicate with the library at any time.	39	95.1	2	4.9	-	-	-	-	-	-	203	99.1	2
9	Empowering employees to innovate at work.	30	73.2	9	21.9	2	4.9	-	-	-	-	192	93.7	13
10	Helping beneficiaries to adapt with IT	40	1	13	2.4	-	-	-	-	-	-	204	99.5	1
11	Develop service performance.	38	92.7	2	4.9	1	2.4	-	-	-	-	201	98.1	5
12	Contributing to a solution IT absorption problems.	31	75.6	8	19.5	2	4.9	-	-	-	-	193	94.1	12
13	Solving bureaucratic problems in the absorption of information technology	20	48.8	13	31.7	4	9.8	2	4.9	2	4.9	170	82.9	18
14	Organizing the exchange of experiences between employees	29	70.7	11	26.8	1	2.4	-	-	-	-	192	93.7	13
15	Organize the time of the beneficiaries.	30	73.2	9	21.9	2	4.9	-	-	-	-	192	93.6	14
16	Providing employees and beneficiaries with technical skills.	30	73.2	11	26.8	-	-	-	-	-	-	194	94.6	11
17	Creating a creative learning environment.	35	85.4	6	14.6	-	-	-	-	-	-	199	97.1	6

Classification of the study sample

Study tool

The study sample was classified as follows:

- Managers of public and university libraries
- Specialists in information technology
- Academics specializing in writing and information technology
- Administrators in ministries of education

Through the researcher's review of the study questions and objectives, and according to the scientific methodology used in the design of the Delphi method, the study relied on the questionnaire to collect the expectations of the study experts.

As shown in table 1.

Table 5: Results of the answer to the fourth question "What are the challenges of applying cloud computing in Arab libraries in the digital environment?"

M	The statement	Strongly Agree(5)		Agree(4)		Neutral(3)		Disagree(2)		Strongly Disagree (1)		Relative weight		T
		T	%	T	%	T	%	T	%	T	%	S	%	
1	The immensity of the data causes the difficulty to download and needs time	39	95.1	2	4.9	-	-	-	-	-	-	203	99	2
2	The control problem is trading and sharing data.	38	92.6	3	7.3	-	-	-	-	-	-	203	98.5	3
3	The problem of contracting companies	34	82.9	7	17.1	-	-	-	-	-	-	198	96.2	7
4	How to keep information confidential	40	97.5	1	2.4	-	-	-	-	-	-	204	99.5	1
5	Availability of appropriate applications	30	73.2	11	26.8	-	-	-	-	-	-	194	94.6	9
6	Legal challenges to privacy Beneficiary data	36	87.8	5	12.2	-	-	-	-	-	-	200	97.5	5
7	Technical challenges in what is rapidly linked Internet, software and applications	37	90.2	4	9.8	-	-	-	-	-	-	201	98.1	4
8	Profession challenges for employee acceptance of applications Cloud Computing	32	78	9	21.9	-	-	-	-	-	-	196	95.6	8
9	Training staff to deal with Cloud computing applications	35	85.4	6	11.7	-	-	-	-	-	-	199	97.1	6

The credibility of the tool

The virtual validity of the study instrument was judged by presenting the questionnaire to the experts as arbitrators who were selected.

Delphi Tours:

The first round: It is open questions to experts on the themes of the study, which was answered, where each expert answered its own way, style and recommendations. Second round: In the second round, the wording of the questionnaire was drafted through what has been shown before and after the first round where a draft

questionnaire was prepared and the validity and clarity of the wording were determined. In the light of this, the experts in the first two rounds were to build the questionnaire statements and determine the validity of those phrases, and therefore they represent the arbitrators of the questionnaire. In third round, experts represent the sample of the study, which determines the extent of their approval of the questionnaire statements

5 Study Results and Discussion

The researcher analyzed the results of the study using means, standard deviations and ranks, in order to answer the questions of the study, and arrive at a

conceptualization of the challenges facing the application of cloud computing in Arab libraries in the digital environment. First: The results related to the first study question, which states: "What is the availability of educational materials, equipment and technological innovations in the Arab libraries? The researcher calculated means, standard deviations and ranks for the availability of devices and innovations in Arabic libraries. The results were as shown in table 2. It is clear from the table 2 that the means ranged between (2.07 - 1.26), and standard deviations ranged between (.67 - .55), and degrees of estimation between medium and low. This indicates that the overall availability of educational materials and equipment in Arab libraries, is not as desired or at the level that meets the ambition of the beneficiaries, in the digital environment.

The results shown in table 3 in order to answer the second question, What is the importance of applying cloud computing in Arab libraries in the digital environment?.

It is noted here that the experts of the study sample unanimously high responses to the importance of the application of cloud computing in the digital environment, because it is a reflection of the philosophy of the digital society, and the segment of expert's part of this community.

The responses of the study sample are shown in Table 4, to answer the third question, "What are the requirements for the application of cloud computing in Arab libraries in the digital environment?"

It is noted here that the experts of the study sample show high responses to the importance of the application of cloud computing in the digital environment, because it is a reflection of the philosophy of the digital society, and the segment of experts' part of this community.

To answer the third question, "What are the requirements for the application of cloud computing in Arab libraries in the digital environment?"

Table 5 responses of the study sample to the fourth question. It is clear from the data shown in table 5 that the relative terms of the axes of the requirements of the application of cloud computing Arabic libraries in the electronic environment, is to provide an infrastructure commensurate with the requirements of the digital environment. It is clear from the previous table that the experts of the study sample have responded to a range of challenges facing the application of cloud computing in the digital environment, which were profession challenges, training, and technical challenges such as the availability of applications and programs, storage capacity, huge volume of data, privacy and information security. Study Recommendations and Suggestions: First: Disseminate the culture of cloud computing by establishing a system of cooperation with the relevant authorities, stimulating the use of computing, studying the necessary legislation and increasing confidence in the use of technology. Second, create a new generation of specialists in the field of cloud computing. Third,

knowing the funders of cloud computing services and how to contract with them. Forth, identify appropriate cloud models in which the library can adopt one or more according to its future aspirations.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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